#8

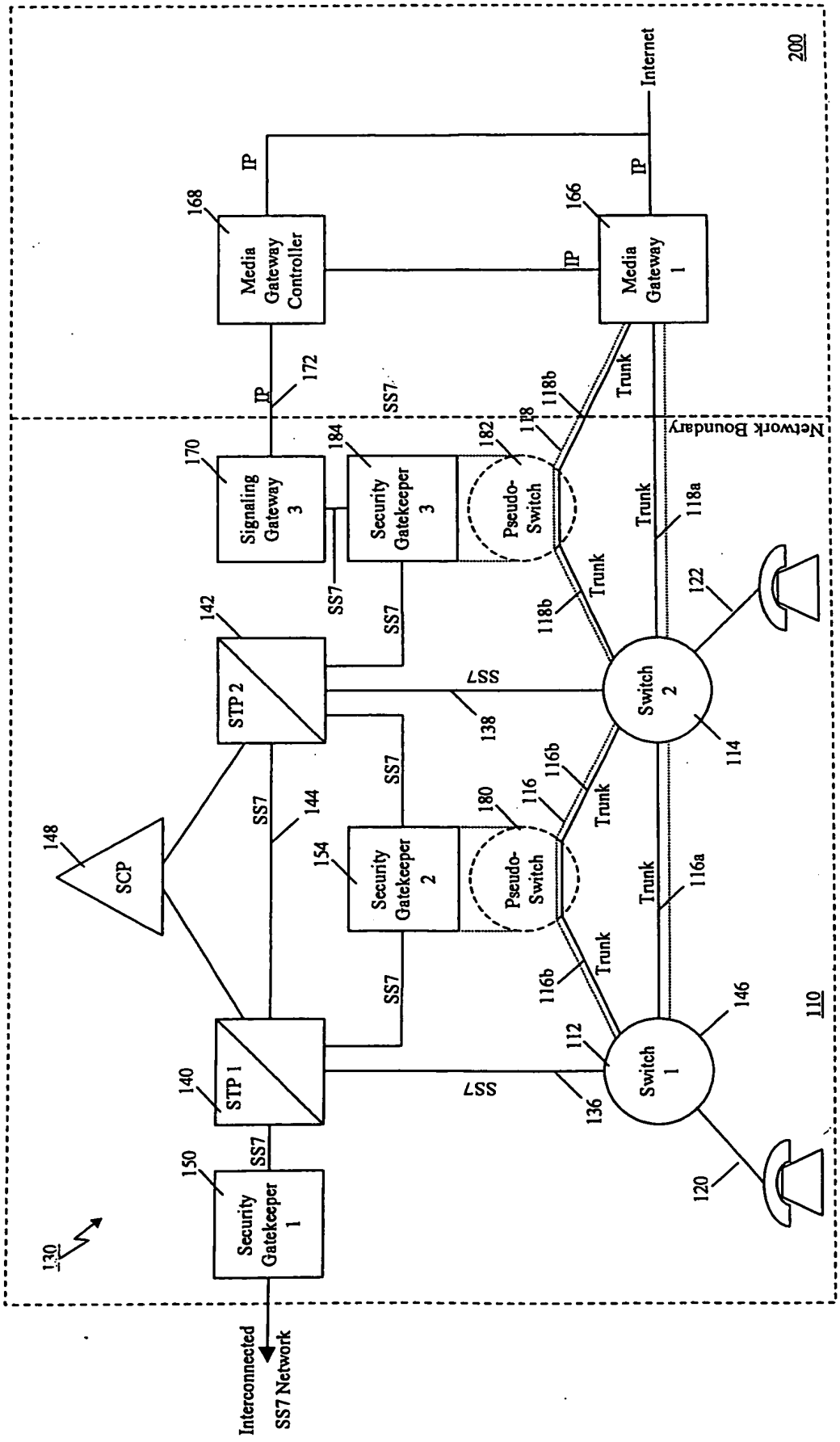

200
Internet
IP
IP
168
Media Gateway Controller
166
Media Gateway 1
IP
IP
172
SS7
Network Boundary
118b
Trunk
170
Signaling Gateway 3
184
Security Gatekeeper 3
182
Pseudo-Switch
118
Trunk
118a
SS7
SS7
118b
Trunk
122
142
STP 2
SS7
Switch 2
138
114
SS7
116b
116
180
Pseudo-Switch
Trunk
144
SS7
148
SCP
154
Security Gatekeeper 2
Trunk
116a
116b
Trunk
SS7
146
110
112
Switch 1
140
STP 1
SS7
136
120
150
Security Gatekeeper 1
130
100
Interconnected SS7 Network

Figure 2

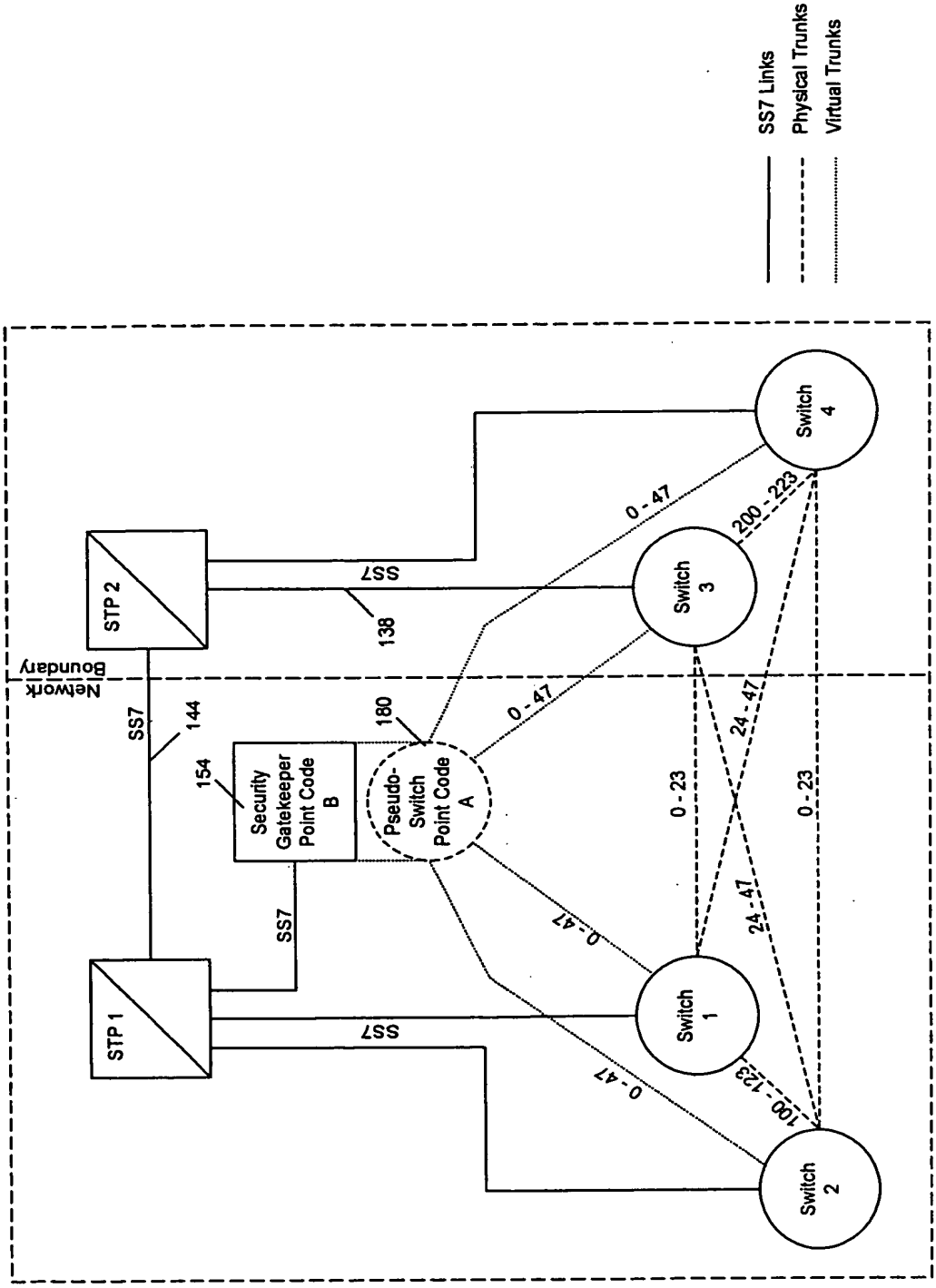

SS7 Links
Physical Trunks
Virtual Trunks
Switch 4
Switch 3
Switch 1
Switch 2
STP 2
STP 1
Network Boundary
SS7
138
144
154
180
Security Gatekeeper Point Code B
Pseudo-Switch Point Code A
0 - 47
200 - 223
24 - 47
0 - 23
100 - 123

Figure 3

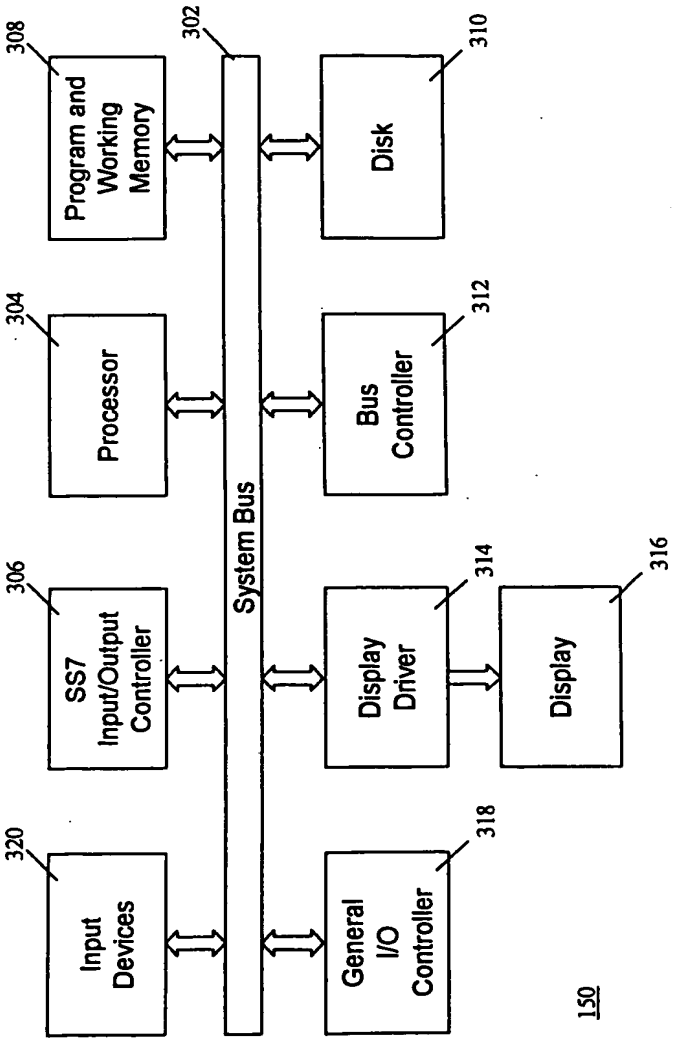
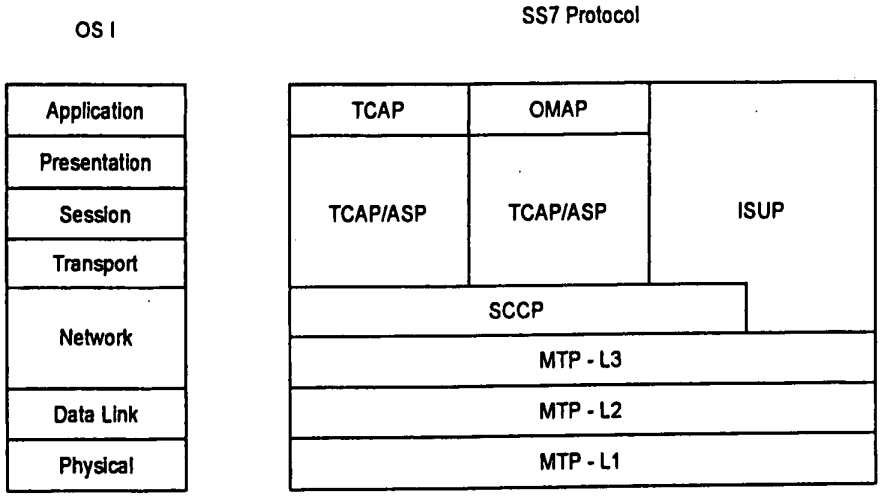

308
Program and Working Memory
302
310
Disk
304
Processor
System Bus
312
Bus Controller
306
SS7 Input/Output Controller
314
Display Driver
316
Display
320
Input Devices
318
General I/O Controller
150

Figure 4



Legend

ASP - Application Service Part (Connection Oriented Protocols
MTP - Message Transfer Part (L1, L2 & L3)
OMAP - Operations, Maintenance, Application Part
SCCP - Signaling Connection Control Part
TCAP - Transaction Capability Application Part

Figure 5

Attny Docket: 414.038CIP/10007256
Inventor(s): Arthur DOSKOW, et al.
Serial No.: 09/767,292
Date Filed: January 18, 2001
Title: METHOD OF AND APPARATUS FOR AUTHENTICATING CONTROL...
Sheet 5 of 15

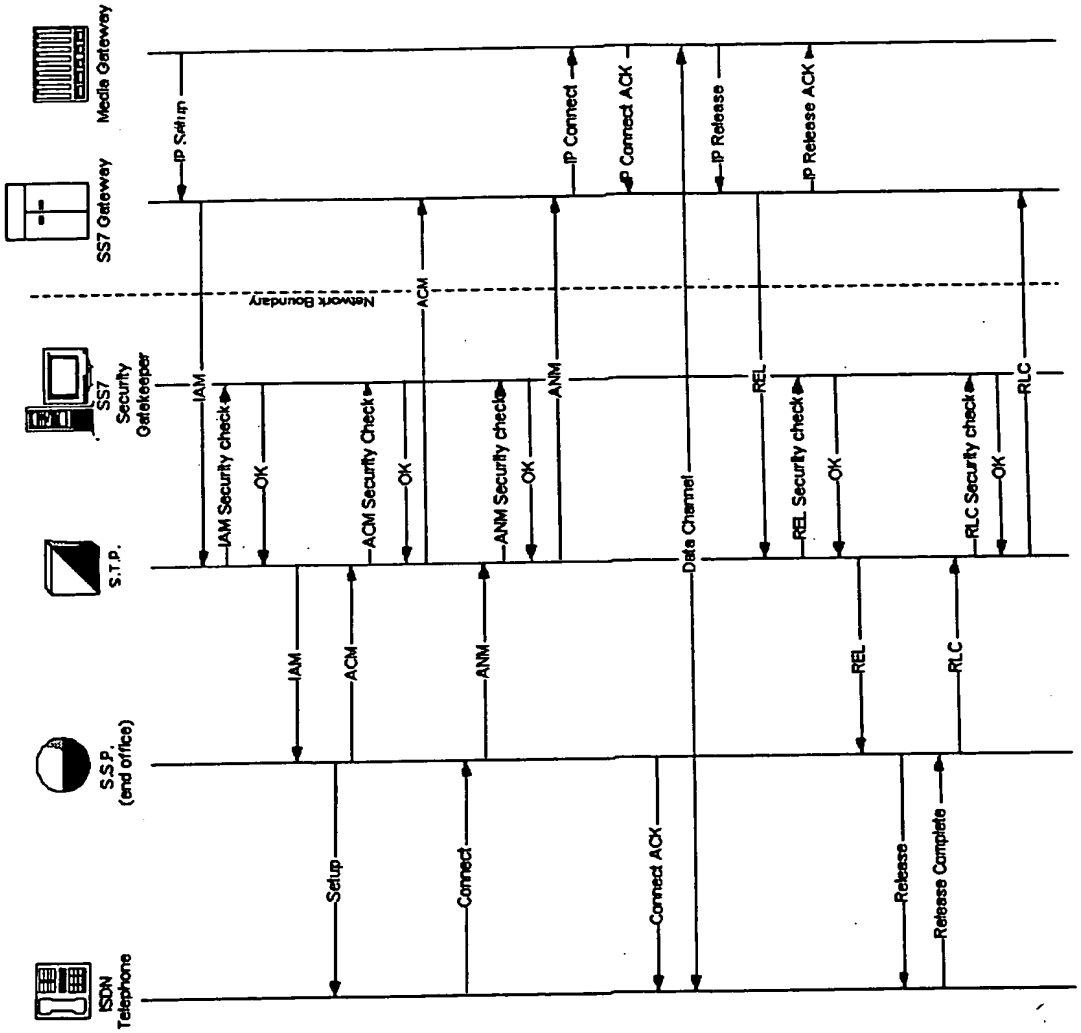

Media Gateway
SS7 Gateway
Network Boundary
SS7 Security Gatekeeper
S.T.P.
S.S.P. (end office)
ISDN Telephone
IP Setup
IP Connect
IP Connect ACK
IP Release
IP Release ACK
IAM
ACM
ANM
REL
RLC
IAM Security check
OK
ACM Security Check
OK
ANM Security check
OK
Data Channel
REL Security check
OK
RLC Security check
OK
IAM
ACM
ANM
REL
RLC
Setup
Connect
Connect ACK
Release
Release Complete

Figure 6

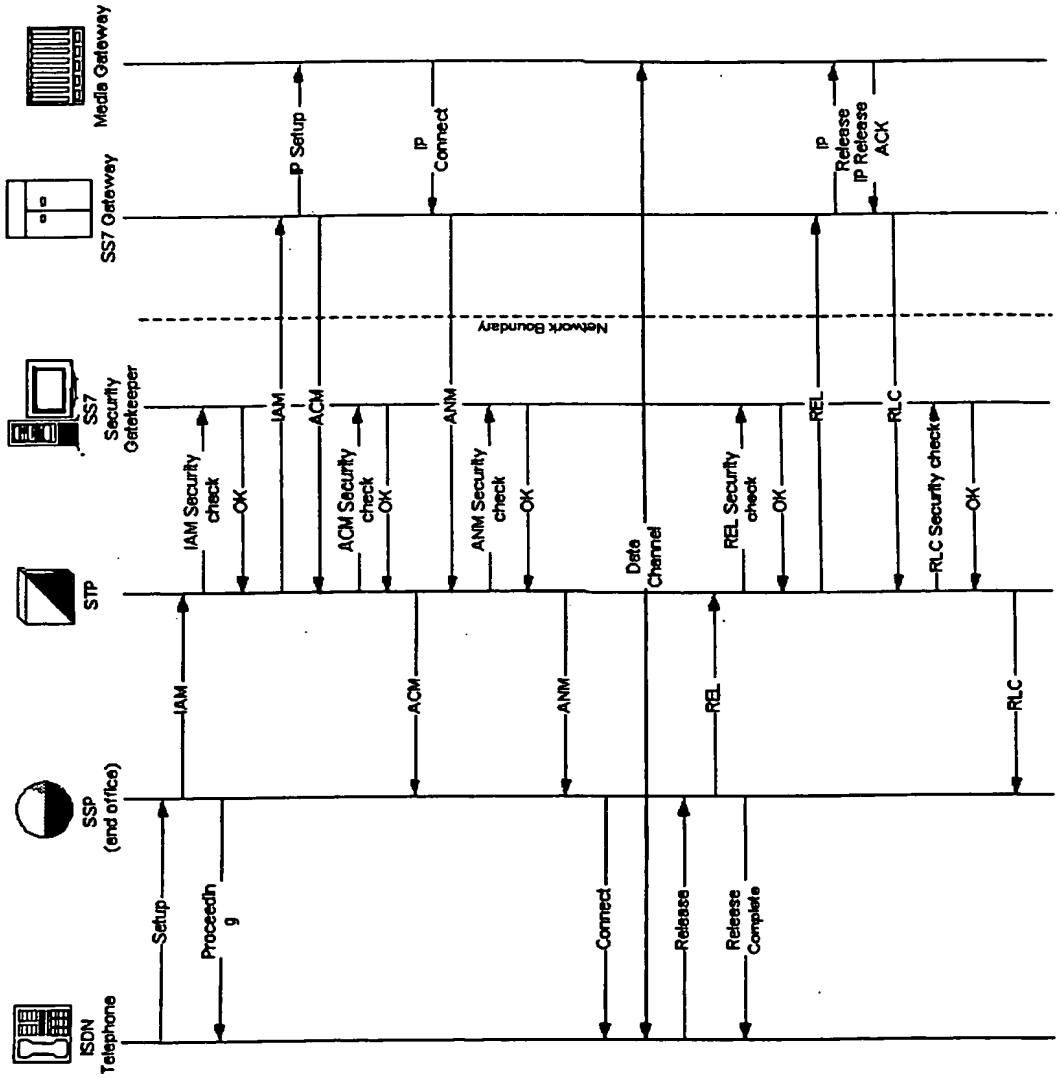

Media Gateway
SS7 Gateway
SS7 Security Gatekeeper
STP
SSP (end office)
ISDN Telephone
IP Setup
IP Connect
IP Release
IP Release ACK
Network Boundary
IAM
ACM
ANM
REL
RLC
IAM Security check
OK
ACM Security check
OK
ANM Security check
OK
Data Channel
REL Security check
OK
RLC Security check
OK
IAM
ACM
ANM
REL
RLC
Setup
Proceeding
Connect
Release
Release Complete

Figure 7

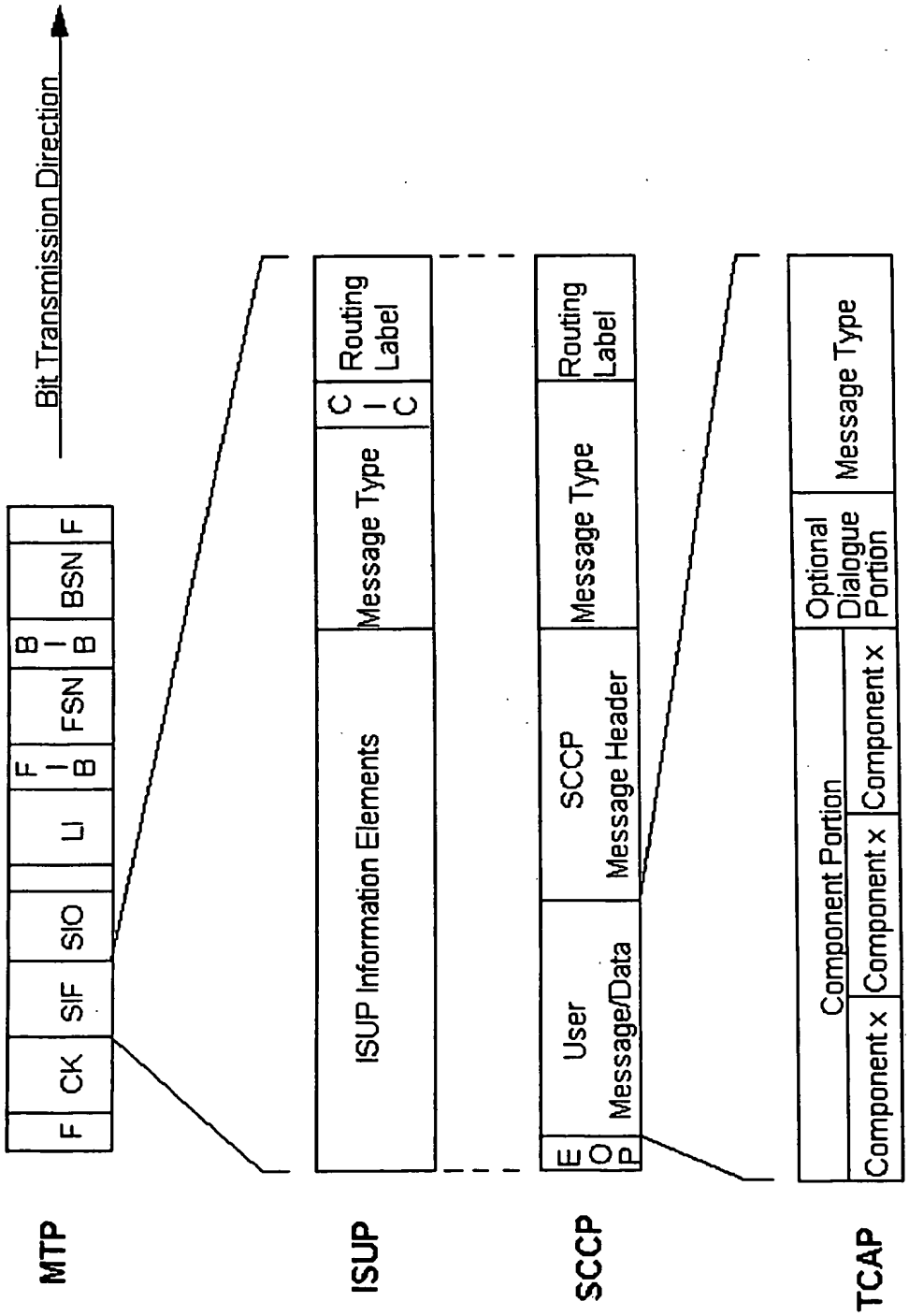

Bit Transmission Direction
MTP
F
CK
SIF
SIO
LI
F I B
FSN
B I B
BSN
F
ISUP
ISUP Information Elements
Message Type
C I C
Routing Label
SCCP
E O P
User Message/Data
SCCP Message Header
Message Type
Routing Label
TCAP
Component x
Component x
Component x
Component Portion
Optional Dialogue Portion
Message Type

Figure 8

ISDN User Part Message Format Coding
(LSSGR GR-606, Iss. 3 11/99)

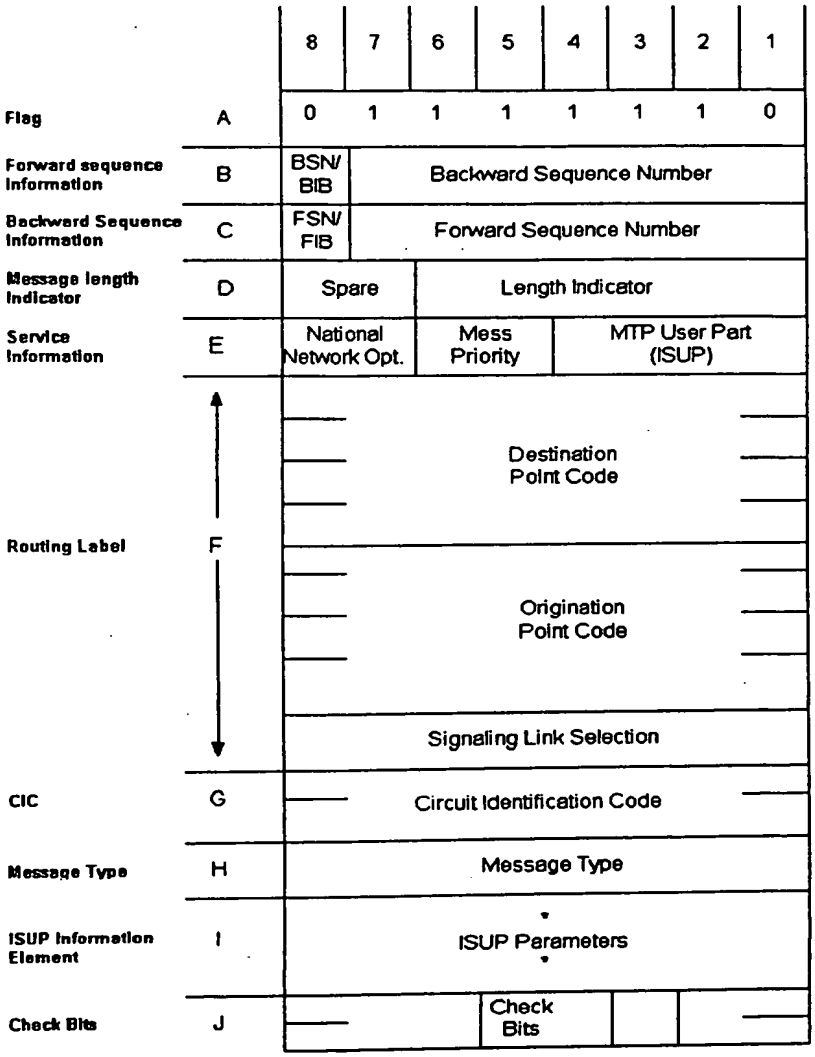


Figure 9

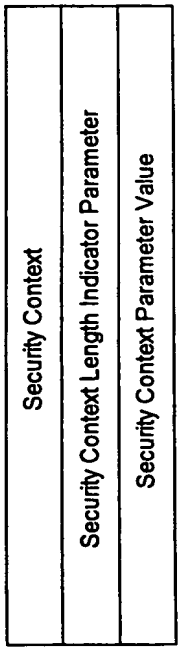


Figure 11

Security Context Values

Value	Meaning
0	Not used.
1	Data Encryption Algorithm
2	Integrity Check
3	Message Code Authentication
4	Sequence, Timestamp and Identification

Figure 12

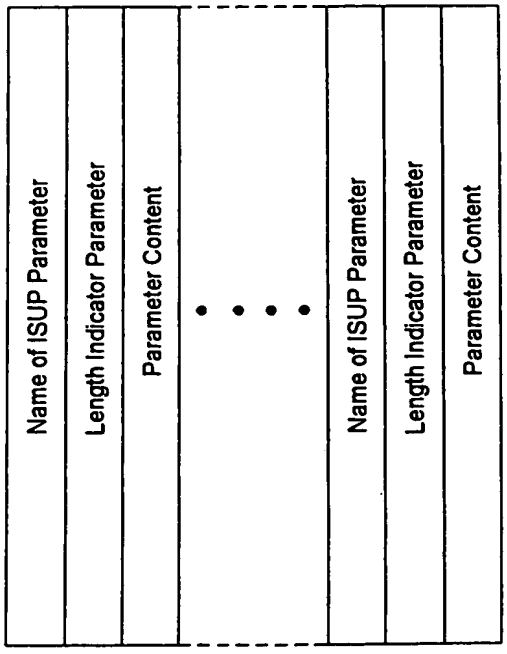


Figure 10

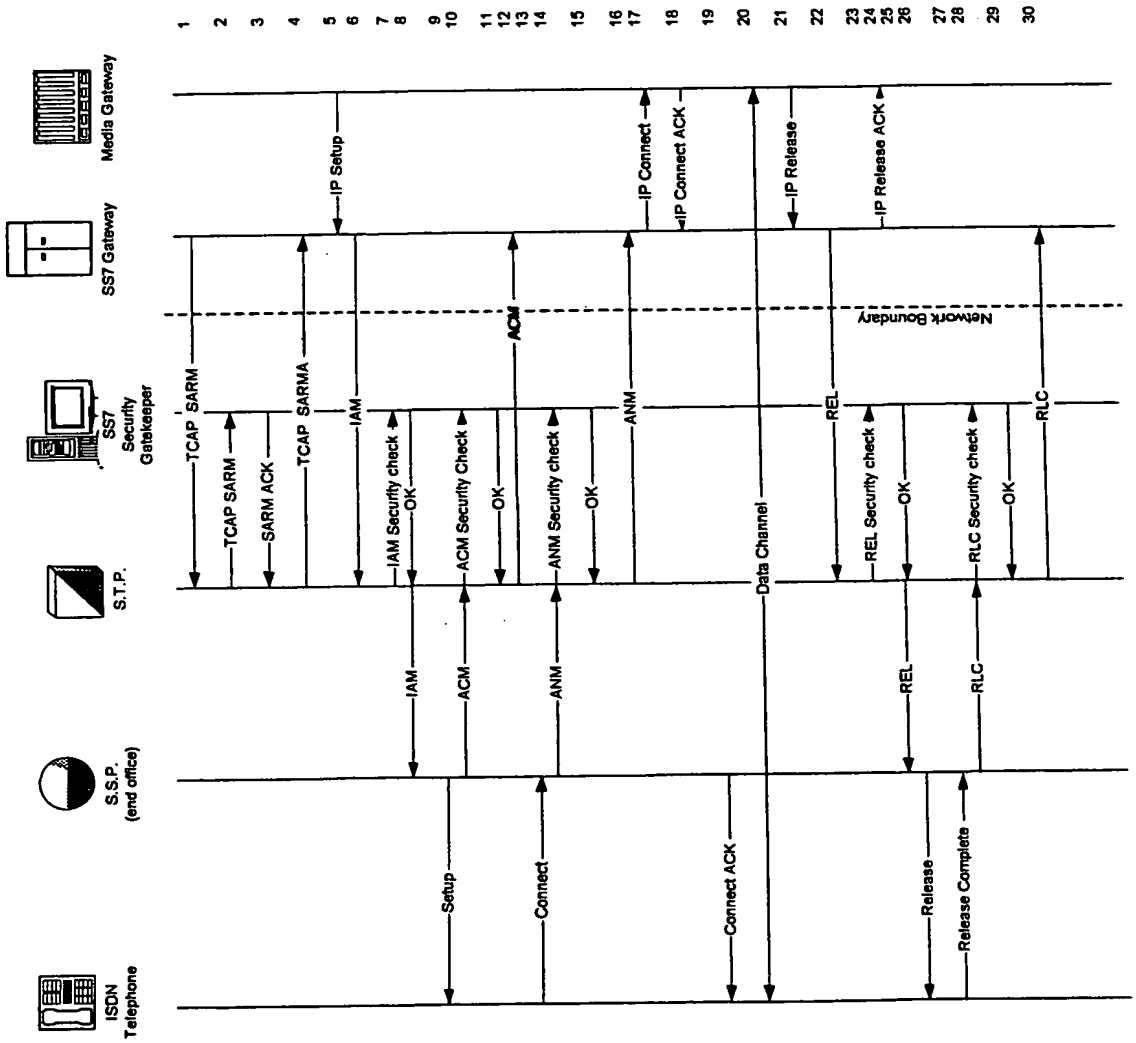

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
Media Gateway
SS7 Gateway
SS7 Security Gatekeeper
S.T.P.
S.S.P. (end office)
ISDN Telephone
Network Boundary
IP Setup
IP Connect
IP Connect ACK
IP Release
IP Release ACK
TCAP SARM
TCAP SARM
SARM ACK
TCAP SARMA
IAM
IAM Security check
OK
ACM Security Check
OK
ACM
ANM Security check
OK
ANM
REL
REL Security check
OK
RLC Security check
OK
RLC
Data Channel
IAM
ACM
ANM
REL
RLC
Setup
Connect
Connect ACK
Release
Release Complete

Figure 13

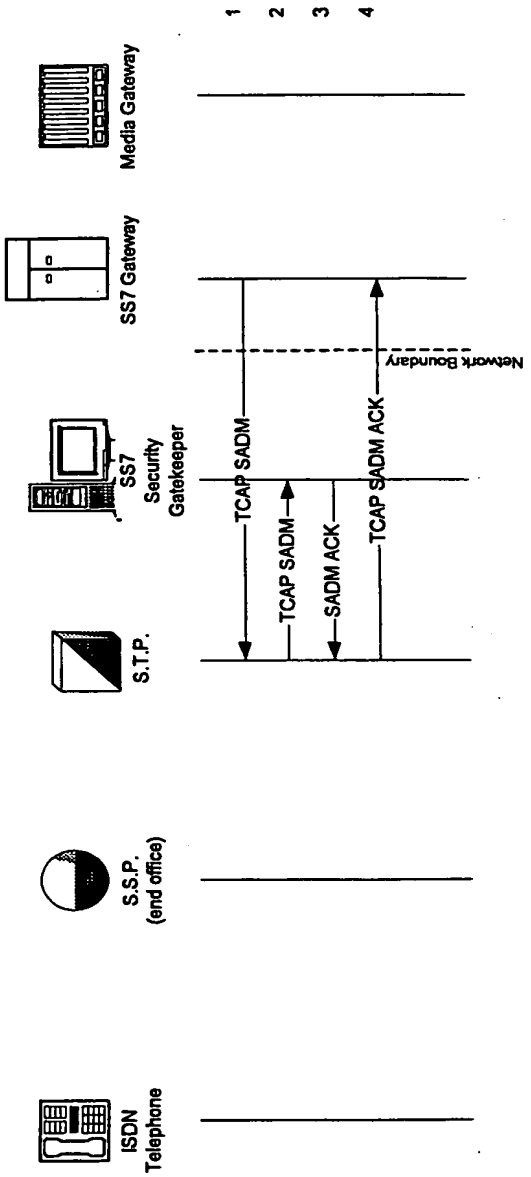

1
2
3
4
Media Gateway
SS7 Gateway
Network Boundary
SS7 Security Gatekeeper
TCAP SADM
TCAP SADM
SADM ACK
TCAP SADM ACK
S.T.P.
S.S.P. (end office)
ISDN Telephone

Figure 14

Initial Address Message

SIO and Routing Label	
CIC Low-Order Octet	
2-bits spare	CIC High-Order 6-bits
Message Type = 1	
Nature of Connection Indicators	
Forward Call Indicator Bits H..A	
Forward Call Indicator Bits P..I	
Calling Party Category	
Offset of 1st Mandatory Var. Parameter	
Offset of 2nd Mandatory Var. Parameter	
Offset of Start of Operational Part	
Length Indicator of User Service Info	
User Service Information No. of Octets = Length Indicator Value	
Length Indicator of Called Party No.	
Called Party Number No. of Octets = Length Indicator Value	
Optional Parameter Code	
Optional Parameter Length Indicator	
Optional Parameter No. of Octets = Length Indicator Value	
End of Optional Parameters Indicator	

Fig. 15

Address Complete Message

SIO and Routing Label	
CIC Low-Order Octet	
2-bits spare	CIC High-Order 6-bits
Message Type = 6	
Backward Call Indicator Bits H..A	
Backward Call Indicator Bits P..I	
Offset to Start of Optional Part	
Optional Parameter Code	
Optional Parameter Length Indicator	
Optional Parameter No. of Octets = Length Indicator Value	
End of Optional Parameters Indicator	

Fig. 16

Attny Docket: 414.038CIP/10007256
Inventor(s): Arthur DOSKOW, et al.
Serial No.: 09/767,292
Date Filed: January 18, 2001
Title: METHOD OF AND APPARATUS FOR AUTHENTICATING CONTROL...
Sheet 13 of 15

Answer Message

SIO and Routing Label	
CIC Low-Order Octet	
2-bits spare	CIC High-Order 6-bits
Message Type = 9	
Offset to Start of Optional Part	
Optional Parameter Code	
Optional Parameter Length Indicator	
Optional Parameter No. of Octets = Length Indicator Value	
End of Optional Parameters Indicator	

Fig. 17

Release Complete Message

SIO and Routing Label	
CIC Low-Order Octet	
2-bits spare	CIC High-Order 6-bits
Message Type = 16	

Fig. 19

Release Message

SIO and Routing Label	
CIC Low-Order Octet	
2-bits spare	CIC High-Order 6-bits
Message Type = 12	
Offset of 1st Mandatory Var. Parameter	
Offset of Start of Operational Part	
Length Indicator of Cause Indicators	
Release Cause Indicator Parameter No. of Octets = Length Indicator Value	
Optional Parameter Code	
Optional Parameter Length Indicator	
Optional Parameter No. of Octets = Length Indicator Value	
End of Optional Parameters Indicator	

Fig 18

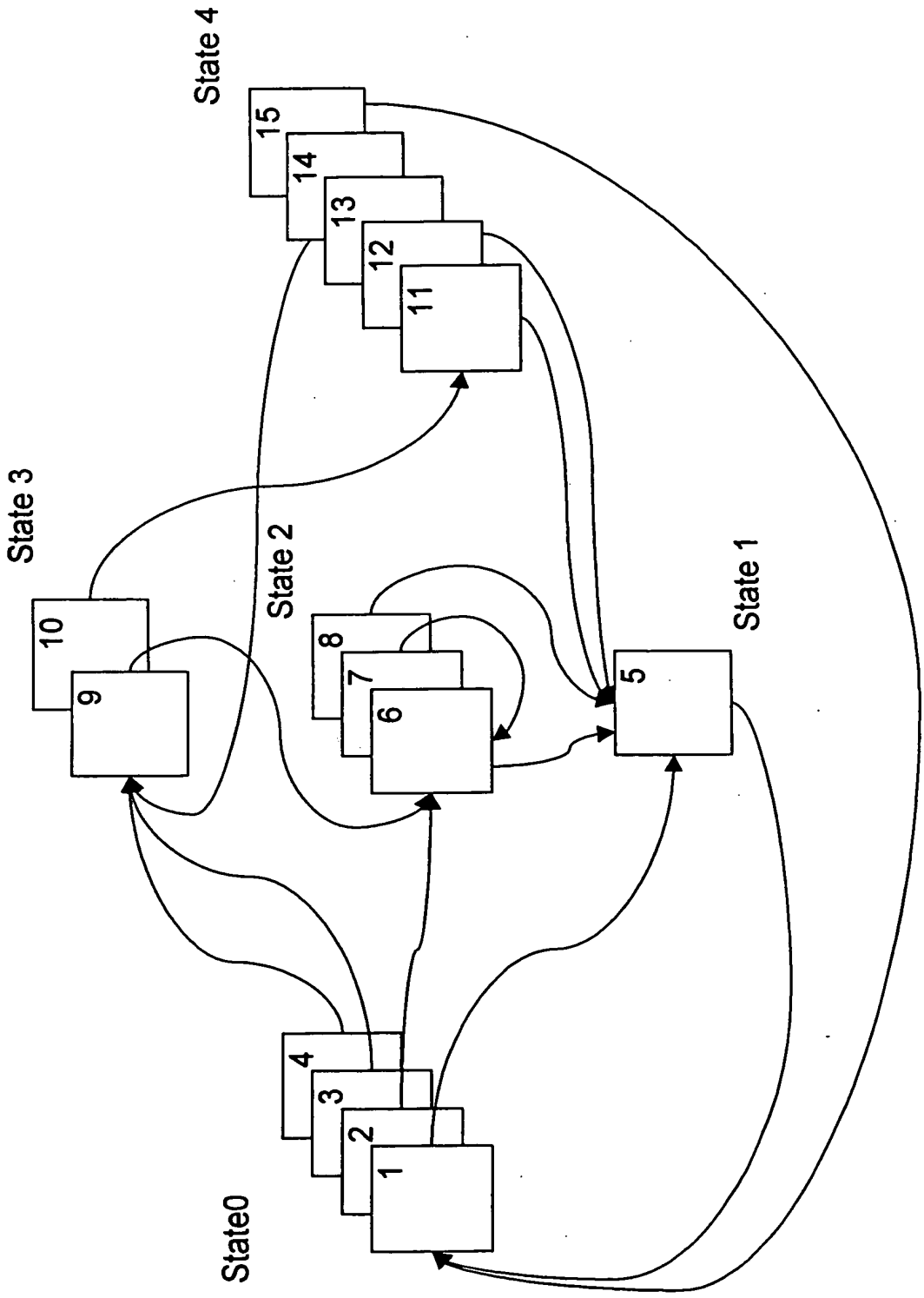

State 4
15
14
13
12
11
State 3
State 2
State 1
10
9
8
7
6
5
4
3
2
1
State0

Fig. 20